SHEARON HARRIS EQUIPMENT QUALIFICATION DOCUMENTATION REVIEW

NED DESIGN GUIDE - DG-VIII.19

REVISION	SUBMITTED	APPROVED
0	2-10-88	2-11-88

"UNCONTROLLED COPY"

2/11/88
HPES CONCURRENCE DATE (REV.0 only)

(EG97/1ah)

SHEARON HARRIS EQUIPMENT QUALIFICATION DOCUMENTATION REVIEW GUIDELINES

INDEX

EQUIPMENT QUALIFICATION
DOCUMENTATION REVIEW GUIDELINES

I. INTRODUCTION

A. Applicability

NED personnel, including NED managed contract personnel who are involved in the review and approval of vendor-supplied equipment qualification documentation.

B. Purpose

To establish the methodology and procedures for reviewing and approving all vendor-supplied environmental qualification documentation for "safety-related" equipment and Regulatory Guide 1.97 instruments that require environmental qualification and documentation or analysis of environmental qualification that is generated by CP&L. This methodology is designed to ensure a consistent and adequate review of each qualification document against the applicable standards and regulatory requirements referenced in paragraph II.A.

Revisions to Equipment Qualification Documentation Packages (EQDPs) must be initiated by a Plant Change Request (PCR) in accordance with AP-600 unless the revisions are editorial or grammatical in nature, or they do not affect the design of equipment and its resultant qualification, conclusion, or maintenance requirements.

II. GENERAL

A. References

1. 10CFR Part 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants"

2. IEEE Standard 323-1974, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations"

3. Regulatory Guide 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants" (Revision 1)

4. NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment"

5. IEEE Standard 344-1975, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations" (as endorsed by Regulatory Guide 1.100)

6. Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Access Plant and Environs Conditions During and Following an Accident" (Revision 3)

7. The most current revisions of IEEE "Daughter" standards and their respective NRC Regulatory Guides which endorse their application

8. Plant Program Procedure (PLP)-108, "Environmental Qualification Program"

9. AP-600, "Plant Change Initiation Requests"

B. Responsibilities

Responsibility		Action	
1.	Equipment Qualification (E.Q.) Group Leader	a.	Assigns review responsibility to appropriate engineer/designer and provides the necessary guidance as to priority, type of review, etc.
		b.	Assigns checker responsibilities to appropriate engineer/designer and provides necessary guidance.
		c.	Provides guidance on the overall review process and to other groups providing supplemental review.
2.	Assigned Engineer/Designer (Reviewer)	a.	Ensures that the document is logged in the Document Control Log (Reference: Attachment D1).
		b.	Conducts a review of the equipment qualification documentation and prepares an EQ package in accordance with the Qualification Documentation. Review procedure of Section III.
		c.	Coordinates interface with Ebasco and/or vendor on resolution of comments.
3.	Assigned Engineer/Designer (Checker)	a.	Conducts a detailed check of the EQ package prepared by the assigned reviewer.
		b.	Coordinates resolution of EQ package deficiencies noted with the reviewer.

	Responsibility		Action
4.	EQ Lead Engineer	a.	Maintains a document review log for traceability of documents and status of review.
		b.	Reviews and approves completed reports using Attachment A-10. All documentation/analysis generated by CP&L will require the Lead EQ Engineer to assure that this information is reviewed by a qualified EQ Safety Reviewer.
		c.	Forwards approved documents to the principal engineer for review and approval.
		d.	Forwards approved documents to SHNPP EQ Coordinator to initiate a baseline maintenance review.
		e.	Designates equipment to be field verified, as applicable.
		f.	Ensures that the EQ packages are updated, as applicable, to reflect plant modifications, design changes, and equipment changes.
5.	Principal Engineer (I&C)	a.	Approves EQ packages and forwards to EQ Lead Engineer for distribution.
6.	EQ Lead Engineer	a.	Retains one copy of the approved documents as the engineering working file copy.
		b.	Forwards designated records to QA in accordance with AP-600 and deletes from Document Control Log. QA records include all harsh EQDPs and revisions to the harsh EQDPs.

C. Review Methodology

This procedure provides a method for the review of all environmental qualification documentation supplied for equipment important to safety. This review uses plant-specific service conditions and, where possible, performance specifications as established by the Shearon Harris FSAR. The procedure and attachments present a qualification review method and data package comprised of forms and

checklists for documenting the qualification review. Completion of these forms in accordance with the procedure set forth in Section III will ensure a consistent and adequate review of each qualification document against the applicable NRC requirements as set forth in the standards and regulatory guides listed in paragraph II.A. The review will include appropriate justification where an alternative approach has been used and/or where a deficiency has been noted.

III. PROCEDURE

A. Qualification Documentation Review Procedure

This procedure is structured such that environmental qualification documentation received for equipment installed in harsh environments may be reviewed by the NED staff. Since Ebasco supplies complete documentation packages, the NED review of these packages will serve as a program overview. When necessary, this Design Guide can be utilized to revise these packages, including (as options) format or forms. However, the equipment qualification documentation received from other vendors, including Westinghouse, must be reviewed and evaluated in-house.

Additionally, safety-related equipment installed in mild environments do not require testing to demonstrate operability in accordance with the applicable performance specifications.

In either event, a review in accordance with this procedure is required for equipment installed in harsh environments and is optional for equipment installed in mild environments.

1. Documentation Package Preparation

The Environmental Qualification documentation package shall be assembled, reviewed, and approved as outlined below. This represents the format for CP&L generated packages. Packages prepared by Ebasco Services are in a different format. Once an Ebasco generated package is received by CP&L and requires revision, it will be converted to the CP&L format with Attachments A-1, A-2, A-3, A-4, A-6, A-7, A-8, A-11, A-14, and Attachment B included as a minimum:

a. Documentation Package Identification Number

The Equipment Qualification Lead Engineer will select an appropriate identification number for reference and filing for all documentation packages. The designated identification number should appear on each review sheet.

b. Documentation Package Contents

Assemble the package in the order presented below and include, as a minimum, the data and forms indicated. The tabbed sections marked with an asterisk (*) are not required for equipment installed in mild environments. Number the pages of each section sequentially utilizing the section identifier and page number. (Example: A1, A2, A3, D1-1, D1-2 [for tabs with subsections], etc.)

Preface Section	Function
Environmental Qualification Documentation Package Approval Sheet (Attachment A-1)	This "Documentation Package Approval Sheet" acts as an approval record and revision control page for the documentation package.
Environmental Qualification Documentation Package Index and Checklist (Attachment A-2)	This "Documentation Package Index and Checklist" is an index of the package and assures that all required documents are enclosed.
Environmental Qualification Status Summary Sheet (Attachment A-3)	This "Qualification Status Summary Sheet" provides the status of the equipment qualification. The comments may refer to discrepancy memorandums or other lists of outstanding items (e.g., letters to vendors and Tab K items).

Tabbed Section	Function
A	Equipment Identification (Attachment A-4) and Component Evaluation Sheets (CES) (Attachment A-5). This section identifies the equipment and provides component evaluation sheets (as required) for each instrument. Complete the Component Evaluation Sheets in accordance with Attachment C. Whenever a conflict exists in regard to operability/environmental parameters between the equipment specification (Tab C) and the CES, the CES takes precedence.

Tabbed Section	Function
	NOTE: Each Component Evaluation Sheet is dated by the Checker as he completes the verification process.
*B	Equipment Functional Description (Attachment A-6). From a reliable source (e.g., FSAR), extract and prepare a brief description (page or less) to enable an auditor to understand the equipment function. Indicate source of data on description.
C	Include the specification with which the equipment was purchased or, if unavailable, the purchase order number for reference.
D	Documentation Index (Attachment A-7) and Qualification Test reports plus other supporting qualification information and applicable NRC EQ notices and/or concerns. If more than one report was submitted by the equipment vendor to establish equipment qualification, provide subtabs for each report in alphanumerically ascending order. For example, if five reports were submitted by a vendor to establish equipment qualification, provide subtabs D.1, D.2, D.3, D.4, and D.5 to assist in report location. The first page in Tab D should index the reports contained therein and the subtabs which locate those reports.
E	Documentation Review Checklist (Attachment B) and Supplemental Review Sheets (Attachment A-8 and A-9). This section contains the Review Checklist, supporting analyses, calculations, and evaluations that address each deficiency and support qualification acceptability and evaluation/resolution of NRC EQ notices.

Tabbed Section	Function
*F	Executive Review Comments (Attachment A-10). This section contains the executive reviewer's comments and a record of resolution by the assigned engineer.
G	Qualification Limitations (Attachment A-11). This form is used to document any requirements placed on the plant to maintain qualification through maintenance and surveillance.
*H	Field Verification Form (Attachment A-12). This section contains completed Field Verification Forms as applicable.
*I	Significant Drawings. Include reference drawings, installation drawings, motor outline drawings, etc., or a list of drawings (Attachment A-14), as applicable.
*J	Deleted
K	Qualification Deficiency List (Attachment A-13). This section provides a running inventory of the qualification deficiencies and their resolution status.

NOTE 1: If the volume of data in a tabbed section is extensive, provide an index as the first page of that section (Attachment A-9).

NOTE 2: Tabbed sections marked with an asterisk (*) are not required for mild packages.

NOTE 3: Review and approval of environmental qualification documentation of CP&L purchased equipment in accordance with this procedure satisfies the design verification requirements set forth in ANSI N45.2.11.

2. Environmental Qualification Documentation Review Checklist

While completing the checklist, the reviewer shall mark the correct response to each question: YES, NO, or N/A (not applicable). Where appropriate, document

and page number(s) providing the specific information shall be cited under the "reference and page" space provided for each question. If no reference need be listed, place "N/A" in the column. The document shall be identified by its assigned identification on the Documentation Index of Tab D (Attachment A-7).

Explanation and justification for any "NO" responses shall be provided. Reference the appropriate document and page to support or further explain the remarks, if possible. Space is provided on the checklist for short remarks. If additional space is required, Attachment A-8 and A-9, "Supplemental Review Sheets", are to be used and included in Tab E.

Tab E should include any additional comments or clarifications necessary to sufficiently summarize and assess the adequacy of the qualification program. Include additional supplemental calculations, evaluations, or analyses necessary to address deficiencies in the qualification.

a. Qualification Methodology

Identify and review the method or methods used to establish qualification. Section 5 of Reference 2 defines the acceptable methods of qualification as: Type Testing, Operating Experience, Qualification by Analysis, Combined Qualification (combination of test and analysis), and On-Going Qualification. Section 2 of Reference 4 states, in general, that for equipment subject to an accident environment only type tests will be accepted to support qualification. However, to avoid confusion, Reference 1, paragraph 50.49(f) provides four methods for qualification that allow qualification by analysis if it is in combination with partial type test data that supports the analytical assumptions and conclusions. Reference 1 should be followed as the ultimate governing authority in case of conflicts or confusion between References 2 through 7.

The qualification method(s) should conform to the requirements of Reference 1 or any deviations should be justified.

On-going qualification as an alternative should be avoided and utilized as a last resort when no other substitutes or methods exist.

Compare the actual test sequence against that required by Reference 2, Section 6.3.2, and Reference 4, Section 2.3(1). Deviations from the required sequence should be identified. The actual test sequence used should be reviewed for acceptability.

Auxiliary devices which may have an effect on or could be affected by the performance of tested equipment should be addressed in the qualification program. Any connection used during the test should be consistent with those available for use in the field. Where the qualification is dependent upon the interface or the quality of the connections, confirm that they are completely described in the reports. See Section 6.3.1.3 of Reference 2 for additional clarification.

Identify special mounting features used (bolts, clamps) and spatial orientation. Ensure that these features are such that they may be used during the actual field installation and are described in the specifications. The equipment must be installed during testing on test fixtures consistent with the specified mounting features. See Reference 2, Section 6.3.1.2 for clarification.

b. Pre-Aging

Review the documentation to determine whether all significant aging mechanisms are adequately addressed. For Westinghouse, see WCAP-8587, Appendix B, for a description of potential aging mechanisms. Look particularly for appropriate consideration of synergisms, vibration (seismic and nonseismic), and cycling (electrical and mechanical) effects.

1. Thermal Aging

Review the documentation for evidence that equipment service life has been satisfactorily simulated in accordance with Reference 1, Section E(5); Reference 2, Section 6.3.3; and Reference 4, Section 4. The method used must be specified and justified. Aging temperatures and activation energies should be specified and justified.

2. Radiation Aging

The qualification documentation must address the effects of radiation exposure on the equipment performance and provide

assurance that the equipment is capable of performing its required safety functions. The means and extent of radiation exposure must be identified and justified consistent with Reference 1, Section E(4); Reference 2, Section 6.3.4; and Reference 4, Section 2.2(12).

For Westinghouse documentation, a discussion of required radiation exposure levels and justification for values selected is provided in WCAP-8587, Section 6.8.2 and 7.2.6.

c. Design Basis Event (LOCA/MSLB)

Review the documentation to determine whether the service conditions to which the equipment is exposed during LOCA, HELB, or MSLB testing are appropriate for the equipment function and location and that the postulated accident environment is adequately simulated in accordance with Reference 1, Section E; Reference 2, Section 6.3.6; and Reference 4, Section 2.2 (5), (9), (10), and (11). Verify that extremes of power supply voltage and frequency are applied during DBE, harsh environment testing if these affect the equipment function. Where caustic spray is a potential hazard to the equipment, verify that it is appropriately included in the testing.

Attach to the checklist, if supplied, copies of temperature versus time curves from qualification test reports. Curves should include specified and measured data. If curves are not available, then make a comparison of the specified profile data points to the measured test points over the time as described in the SHNPP FSAR.

For all environmental parameters, the margin incorporated into the test parameters in excess of the specified parameters should be defined. See Section E(8) of Reference 1; Section 6.3.1.5 of Reference 2; and Sections 1.4, 3, Appendix C, and Appendix D of Reference 4 for recommended criteria in the application of margin.

NOTE: The Design Basis Event (LOCA/MSLB) section of the checklist is not applicable to equipment installed in mild environments.

d. Monitoring

Review the variables measured during the test and the equipment used to perform these measurements. Verify that monitoring of specified variables assures performance of required safety functions in accordance with Section D(1)(2) of Reference 1; Section 6.3.1.4 of Reference 2; and Section 2.2(6), (7), and (9) of Reference 4.

e. Documentation

Documentation should include inspection results and performance data taken before, during, and after tests and should ensure that the condition/performance of equipment components is acceptable. Any modification to either the equipment or test specifications should be identified and reviewed to verify that the test has not been invalidated.

As required by Section j (1)(2) of Reference 1 and Reference 2, the documentation must provide an auditable and traceable link between the actual equipment qualified and the equipment provided or to be provided to each plant.

The test results should demonstrate that the equipment tested will perform its safety function at all times. Failures must be fully explained and be consistent with the failure criteria specified in the test plan, test program, and standardized by Section I(4), (5) of Reference 1; Sections 8.3, 6.4.2, 6.5.3.1, 6.5.4, and 8.5 of Reference 2; and Sections 2.2(2), 5(1), 5(2), 2.1(2), (4), and 2.4 of Reference 4. Analyses must ensure that there is no evidence of a common mode failure mechanism. The qualified life determined by the qualification program must be explicitly stated and the aging program must justify and support that stated life. Where qualified life is dependent upon special maintenance or periodic component replacement, the requirements must be explicitly stated in the documentation and described in Tab G. (Attachment A-11).

B. In order to allow implementation of a maintenance activity to support replacement of components, materials, etc., as identified as environmental qualification limitations in the EQDPs, NED will generate and/or update Equipment Qualification Base Line Forms (EQBLF) to be used as a supplement to the vendor manual for the appropriate equipment. This form will summarize the maintenance

activities necessary to maintain the equipment in a qualified condition. These forms will be transmitted to the NED Vendor Manual Coordinator and the SHNPP EQ Coordinator using the transmittal forms in Attachment E. Upon receipt of these transmittals, the appropriate parties will sign and date these forms and return a copy to the EQ Lead Engineer to document receipt of this information.

EQBLF1 is a four-page form that represents Equipment Qualification Base Line maintenance requirements for the various purchase orders, vendors, and model numbers associated with the EQDP and is included in Attachment E. EQBLF10 is a one-page form that details the lubricants, component parts, complete component, sealants, and special tools associated with each model number component. This form is also included in Attachment E. Forms EQBLF1 and EQBLF10 comprise the vendor manual EQ supplement issued by NED.

ATTACHMENTS

ATTACHMENT A

ENVIRONMENTAL QUALIFICATION DOCUMENTATION REVIEW FORMS

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION PACKAGE APPROVAL SHEET

PACKAGE NO. _____

REVIEWED BY: _____

CHECKED BY: _____

APPROVED BY: _____

This revision record indicates the status of the other sheets of the documentation package. This sheet is revised when any other sheet of the package is revised subsequent to the original issue.

REV.	PAGE	REMARKS	REVIEWED	CHECKED	APPROVED

ENVIRONMENTAL QUALIFICATION DOCUMENTATION PACKAGE INDEX AND CHECKLIST

PACKAGE NO. _____

SECTION	ENGINEER/DATE	CONTENTS	PAGES
Preface (a)	_____	Documentation Package Approval Sheet	_____
Preface (b)	_____	Documentation Package Index and Checklist	_____
Preface (c)	_____	Qualification Status Summary	_____
A	_____	Equipment Identification and Component Evaluation Sheet(s)	_____
B*	_____	Equipment Functional Description and Summary	_____
C	_____	Applicable Tech. Specification or Design Criteria	_____
D	_____	Qualification Documentation and Index	_____
E	_____	Documentation Review Checklist, Supplemental Review Sheets, Calculations, etc.	_____
F*	_____	Executive Review Comments	_____
G	_____	Qualification Limitations	_____
H*	_____	Field Verification Sheets	_____
I*	_____	Significant Drawings	_____
J	N/A	Deleted	N/A
K	_____	Qualification Deficiencies	_____

* Not required for mild package

ENVIRONMENTAL QUALIFICATION
STATUS SUMMARY SHEET

PACKAGE NO. _____

This Documentation Package meets the requirements of 10CFR50.49, IEEE-323-1974, and NUREG-0588 on Documentation and provides assurance that the safety-related equipment identified on Attachment A-4 is:

QUALIFICATION STATUS

- ☐ Qualified for _____ years (see Qualification Limitations, Section G)
- ☐ Qualified - (Awaiting Data, Minor Analysis or Comments)
- ☐ Interim Operation Justified
- ☐ Replace/Relocate/Shield/Modify Equipment
- ☐ Requires Major Analysis
- ☐ Retest Equipment (Undergoing Qualification)
- ☐ Demon. NUREG-0588 Cat. C (Not Safety Related)

PACKAGE IS

- ☐ Complete
- ☐ Not Complete

Applicable Standard

- ☐ NUREG-0588, CAT. I
- ☐ NUREG-0588, CAT. II

COMMENTS: _____

_____

_____

_____

The basis for this documentation package is the FSAR commitments in Section 3.11 of the FSAR. It is not the intent of this package to include the complete engineering of system components, rather it provides the direction to reasonably demonstrate qualification.

Engineer: Print Name and Sign/Date _____

Checker: Print Name and Sign/Date _____

ENVIRONMENTAL QUALIFICATION EQUIPMENT IDENTIFICATION

PACKAGE NO._____

DESCRIPTION: _____

MANUFACTURER: _____

MODEL NO. _____ P. O. NO.: _____

PLANT ID NUMBER: _____

ENVIRONMENTAL QUALIFICATION REQUIREMENTS (WORST CASE): LOCATION: _____

RAD ZONE: _____

	NORMAL	ACCIDENT
TEMPERATURE:		
PRESSURE:		
HUMIDITY:		
SPRAY, BORON:		
SPRAY, pH:		
RADIATION, GAMMA:		
RADIATION, BETA:		
CYCLING:		
VOLTAGE:	±	±
OPERATING TIME:		
SUBMERGENCE:		
MODE:		ACTIVE: _____
		PASSIVE: _____
		FAIL-SAFE: _____

REFERENCES: _____

ENGINEER: Print Name & Sign/Date: _____

CHECKER: Print Name & Sign/Date: _____

A/E: EBASCO SERVICES INC. FACILITY: SHEARON HARRIS NPP - 1 NSSS: WESTINGHOUSE - PWR REVS-
UTILITY: CAROLINA POWER & LIGHT COMPONENT EVALUATION SHEET CAPACITY:900 MW(E) CES#-

EQUIPMENT DESCRIPTION	ENVIRONMENT PARAMETER	ACTUAL 1	DEM. QUALIF. 2	DOCUMENTATION ACTUAL 3	DEM. QUALIF. 4	QUALIF. METHOD 5	H/M 6	OUTS ITEMS 7	
TAG NO :	OPERABILITY NORM/TEST DBA				SRSO	COMB. TEST & SUPPL. REVIEW	/	NONE	
EQUIPMENT: TYPE	TEMPERATURE				SRST	COMB. TEST & SUPPL. REVIEW	/	NONE	REPLACEMENT:
COMPONENT:	PRESSURE				SRSP	COMB. TEST & SUPPL. REVIEW	/	NONE	MAINTAIN.:
MANUFACTURER: MAJOR : SUPPLIER	RELATIVE HUMIDITY				SRSH	COMB. TEST & SUPPL. REVIEW	/	NONE	SUBCOMPONENTS: NO UNIQUE TAGGED SUBCOMPONENTS ARE ENVELOPED BY THIS EQUIPMENT
MODEL AND: SERIAL # FUNCT.DES: & SERVICE	CHEMICAL SPRAY				SRSC	COMB. TEST & SUPPL. REVIEW	/	NONE	
ACCUR. SPEC:	R GAMMA A BETA D B SHIELD S T.I.D.				SRSR	COMB. TEST & SUPPL. REVIEW	/	NONE	
ACCUR. DEM.: SPECIFICATIONS: P.O #: PLANT LOC.:	AGE- INST LIFE (PER 323- 1974 DEF.)				SRSA	COMB. TEST & SUPPL. REVIEW	/	NONE	SAFETY FUNCTION:
COORDINATES X- Y- Z-	SUBMERGED LEVEL				SRSS	COMB. TEST & SUPPL. REVIEW	/	NONE	

INSTALLED (Y/N):
INSTAL. REF:BY-FLD
QUALIF EXEMPTN: NOT APPLIC

PARAMETER	SUPPL. REVIEW
OPERABILITY	O
TEMPERATURE	T
PRESSURE	P
REL. HUMDTY	H
CHLM. SPRAY	C
RADIATION	R
AGING	A
SUBMERGENCE	S

*QUALIF:
*STATUS

EQ. PCK # :

USR8 CATEG.:
APPENDIX E

FOR PUNCHLIST ITEMS SEE SH EQ PACKAGE:

REFERENCES:

QUALIFICATION SIGN-OFF FOUND IN DOCUMENTATION PACKAGE:

CES#-

REVISION # :
DATE :

SYSTEM :

TAG :

Revision 0

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Attachment A-5
Revision 1

ENVIRONMENTAL QUALIFICATION
EQUIPMENT FUNCTIONAL DESCRIPTION

PACKAGE NO. _____

The following FSAR references were used by the reviewer in the audit of the Environmental Qualification of Equipment in this package:

FSAR Sub Section(s) _____ Amendment _____

In addition, the equipment function is summarized as:

Engineer: Print Name & Sign/Date _____

Checker: Print Name & Sign/Date _____

ENVIRONMENTAL QUALIFICATION

DOCUMENTATION INDEX

PACKAGE NO. _____

1. TITLE: _____

_____

_____

REPORT NO.: _____ DATE: _____

SOURCE: _____

2. TITLE: _____

_____

_____

REPORT NO.: _____ DATE: _____

SOURCE: _____

3. TITLE: _____

_____

_____

REPORT NO.: _____ DATE: _____

SOURCE: _____

4. TITLE: _____

_____

_____

REPORT NO.: _____ DATE: _____

SOURCE: _____

5. TITLE: _____

_____

_____

REPORT NO.: _____ DATE: _____

SOURCE: _____

Engineer: Print Name & Sign/Date _____

Checker: Print Name & Sign/Date _____

ENVIRONMENTAL QUALIFICATION
SUPPLEMENTAL REVIEW SHEET

PACKAGE NO. _____

PARAMETER: _____

QUALIFICATION STATUS: _____

DEFICIENCIES REQUIRING RESOLUTION: _____

ENVIRONMENTAL QUALIFICATION
SUPPLEMENTAL REVIEW SHEET (cont'd)

PACKAGE NO. _____

	Rev. 0	Rev. 1	Rev. 2	Rev. 3
Reviewer				
Date				

ENVIRONMENTAL QUALIFICATION
EXECUTIVE REVIEW COMMENTS

PACKAGE NO. _____

NO.	COMMENT	RESOLUTION/INITIAL/DATE

ENVIRONMENTAL QUALIFICATION LIMITATIONS

PACKAGE NO. _____

1. EQUIPMENT IDENTIFICATION:

   DESCRIPTION: _____

   MANUFACTURER: _____

   MODEL NO.: _____

   PLANT ID NO: _____

2. INSTALLATION REQUIREMENTS:

   MOUNTING: _____

   INTERFACE: _____

   OTHER: _____

3.

MAINTENANCE ACTIVITY	PERIOD	REFERENCE

4. STORAGE REQUIREMENTS:

   STORAGE CLASS: _____ SHELF LIFE: _____

   OTHER: _____

5. OTHER REQUIREMENTS:

ATTACHMENT A-12
REV. 1

FIELD VERIFICATION FORM
PACKAGE NO. _____

EQUIPMENT DESCRIPTION	INSTALLATION STATUS	NAME PLATE VERIFICATION	INSTALLATION COMPLETION SCHEDULE
TAG NO.: _____	INSTALLATION STATUS: (CHECK APPLICABLE)	Is Model No. Correct?	
SYSTEM: _____	MOUNTED: _____	YES: _____	
	TERMINATED: _____	NO: _____	MOUNTING: _____ (Date)
COMPONENT: _____		If No, enter correct	
MANUFACTURER: _____	Is a conduit Sealing Device Required?	Model Number:	TERMINATING: _____ (Date)
_____	YES: _____	_____	
_____	NO: _____	Is Serial No. Correct?	CONDUIT SEAL: _____
MODEL NO. _____		YES: _____	(if applicable) (Date)
_____	If required, is the seal now installed?	NO: _____	
SERIAL NUMBER: _____	YES: _____		
_____	NO: _____	Verifier's Comments: _____	
_____		_____	
LOCATION COORDINATES:	LOCATION VERIFICATION	_____	
X: _____	Inside Containment: ____	_____	
Y: _____	Outside Containment: ____	_____	
Z: _____	Steam Tunnel: _____	_____	
	Are Location Coordinates correct?	Completed by: _____ (Signature) (Date)	
	YES: _____	Reviewed by: _____ (Signature) (Date)	
	NO: _____		
	If No, enter correct coordinates:	Note: For in containment equipment mounted on or near the Post DBA Minimum flood level of 228.3, give elevation to within plus or minus one inch; otherwise accuracy to within one foot is sufficient.	
	X: _____		
	Y: _____		
	Z: _____		

Revision 0

ATTACHMENT A-13
REV. 1

ENVIRONMENTAL QUALIFICATION DEFICIENCY LIST

PACKAGE NO. _____

ITEM NO	COMPLETION DATE	DWG OR REF. NO.	ITEM DESCRIPTION/INFORMATION	RESPONSIBLE PARTY

*Line out items as they are completed.

ENVIRONMENTAL QUALIFICATION
REFERENCE DRAWINGS

PACKAGE NO. _____

To reduce redundant storage of data, the following reference drawings are applicable but not included in this EQ package:

DRAWING NUMBER	REVISION

ATTACHMENT B

ENVIRONMENTAL QUALIFICATION DOCUMENTATION REVIEW CHECKLIST

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE			REFERENCE AND PAGE
		YES	NO*	NA	
A.	QUALIFICATION METHODOLOGY				
1.	Is qualification method appropriate for equipment function/location per guidance of NUREG-0588?				
2.	Does the test sequence conform to IEEE 323-1974, or are deviations adequately justified?				
3.	Does the test report provide adequate equipment identification and specify the number of units tested?				
4.	Was the test specimen identifical to or of the same generic family as the SHNPP equipment?				
5.	Was the same test specimen used throughout test sequence?				
6.	Were the required auxiliary devices and interfaces appropriately simulated during the actual test? or, is an analysis provided to justify other interface or auxiliary device simulation?				
7.	During the test program, were the test specimens mounted in a manner consistent with the SHNPP field installation?				
8.	If the test specimen was only similar to the SHNPP equipment, is there a supporting analysis to compare the materials, components, structure, etc., to demonstrate qualification acceptability?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE YES	RESPONSE NO*	RESPONSE NA	REFERENCE AND PAGE
B.	PRE-AGING				
1.	THERMAL AGING				
.a	Was the thermal aging program based on arrhenius techniques?				
.b	Were the effects of self-heating considered?				
.c	Are age-sensitive component materials identified?				
.d	Was the temperature for accelerated thermal aging verified to be less than temperatures at which known material phase changes occur?				
.e	Does the aging program and accompanying analysis (if applicable) provide for a 40-year qualified life at the SHNPP defined service temperature?				
.f	Is the aging program and accompanying analysis (if applicable) auditable?				
2.	CYCLE AGING				
.a	Was the equipment subjected to mechanical cycling consistent with the SHNPP 40 year requirement?				
.b	Was the equipment subjected to electrical cycling consistent with the SHNPP 40 year requirement?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE YES	RESPONSE NO*	RESPONSE NA	REFERENCE AND PAGE
3.	RADIATION AGING				
.a	Was the radiation requirement accomplished by test? Or, if not, was justification provided for its exclusion?				
.b	Was the normal radiation applied prior to and/or simultaneously with the accident simulation?				
.c	Was Cobalt-60 used as the gamma source during testing?				
.d	If any radiation exemptions were utilized, are they auditable?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE			REFERENCE AND PAGE
		YES	NO*	NA	
4.	POST-AGING OPERABILITY				
.a	Did the pre-aged equipment perform successfully at the extremes of its normal service conditions (temperature, radiation, pressure, voltage, current, humidity, etc.) as required by IEEE 323-1974 and NUREG-0588?				
.b	Was the functional test performed adequate to demonstrate the operability parameters as seen in service?				
.c	Were acceptance/failure criteria clearly defined?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE			REFERENCE AND PAGE
		YES	NO*	NA	
C.	DESIGN BASIS EVENT (LOCA/MSLB)				
1.	Were all peak temperature/pressure and time requirements during the transient phase enveloped?				
2.	Were all temperature/pressure and time requirements during the post-accident phase enveloped?				
3.	Were margins as applied consistent with those defined in NUREG-0588 and IEEE 323-1974, as applicable?				
4.	Was the requirement for chemical spray enveloped?				
5.	If submergence is a requirement, does the test demonstrate acceptable operation?				
6.	Were expected extremes of power supply voltage and frequency applied during DBE testing?				
7.	Were the functional tests as performed adequate to demonstrate that the functional requirements (accuracy, repeatability, insulation resistance, etc.) for the equipment can be met?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE			REFERENCE AND PAGE
		YES	NO*	NA	
D.	MONITORING				
1.	Was the operating environment, service conditions, and performance characteristics measured and recorded?				
2.	If these measurements were noncontinuous, is there a justification analysis provided?				
3.	Is the calibration of the instrumentation used to monitor the required variables traceable to the National Bureau of Standards?				
4.	Did the monitoring of variables during the test sequence demonstrate acceptable equipment operation?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ENVIRONMENTAL QUALIFICATION
DOCUMENTATION REVIEW CHECKLIST

PACKAGE NO. _____

NO.	QUESTION	RESPONSE			REFERENCE AND PAGE
		YES	NO*	NA	
E.	DOCUMENTATION				
1.	If failures occurred during the test program, are adequate justifications provided in the form of a failure analysis such that the qualification is not negated?				
2.	If any modifications are made to the equipment after start of testing, was the test program modified to reflect these changes or was justificiaton provided that indicated that such modifications did not negate the qualification?				
3.	Are maintenance requirements and component replacement intervals specified?				
4.	Were all assumptions made by the vendor documented and justified to be acceptable?				
5.	Were all known synergisms accounted for in the test sequence?				
6.	Is the documentation auditable and traceable to the SHNPP equipment?				
7.	Does the documentation demonstrate that this equipment can perform its required safety function under normal and accident conditions?				

*All questions marked "NO" require additional analysis to justify qualification.
NA = Not Applicable

ATTACHMENT C

COMPONENT EVALUATION SHEET COMPLETION INSTRUCTIONS

COMPONENT EVALUATION SHEET
COMPLETION INSTRUCTIONS

1. Enter data below the "Equipment Description" designation as follows:

TAG NO.	Enter the specific device alpha-numeric designation.
EQUIPMENT TYPE	Enter designation of equipment (e.g., sensors, motors) which corresponds to NUREG-0588 Appendix E, Section 1.d categories.
COMPONENT	Enter a brief title or description of the item being evaluated (Note: components are the smallest breakdown of equipment types or categories for qualification purposes).
MANUFACTURER	Enter the specific vendor who manufactured the component, but not necessarily the supplier of the component. For example, Limitorque manufactures valve operators for a valve vendor who in turn supplies the entire valve-operator assembly to the utility.
MAJOR SUPPLIER	Enter the vendor supplying the equipment to the utility, if other than the manufacturer.
MODEL AND SERIAL NO.	Enter the specific vendor designation for a family or group of like components and serial number (if applicable).
FUNCTIONAL DESCRIPTION & SERVICE	Enter a brief description of the service which the component performs.
ACCUR SPEC	Enter either the requirement for accuracy used in Station Safety Analysis or the standard manufacturer's limits used in generic testing or instruments, whichever requires greater accuracy.
ACCUR DEMON	Enter a value which the equipment has demonstrated through testing. This value should be equal to or better than the accur. spec. entry. Value is for the long-term stable operation of instruments.
SPECIFICATIONS	Enter the specification the equipment is designed to meet.

PURCHASE ORDER NO.	Enter the purchase order used during equipment procurement.
PLANT LOCATION	Enter the general plant area location where the component is located (i.e., C321, etc).
COORDINATES "X", "Y", "Z"	Enter the coordinates which locate the equipment within the "Plant Location" and more importantly within the environmental parameter zones.
INSTALLED YES/NO	Enter an indication of installation status.
INSTAL. REF.	Enter the source of data for installation status.
QUALIFICATION EXEMPTION	Entry (rarely made) to indicate equipment need not be qualified by use of CES. For example, a mechanical only device may be on the Master List and is not to be qualified. If this is so, entry of notes in the reference section of CES is expected.
QUALIFICATION STATUS	Enter the environmental qualification status of the equipment as indicated below:

a. Qualified - Without Exception - This category is based upon the existing qualification documentation demonstrating that the equipment will be capable of performing its intended safety function at any time during its qualified life, plus post-accident duration as required. Total compliance with the requirements has been fully documented.

b. Qualified - Awaiting Confirmatory Data - This category is used when most of the qualification report review and analysis, to demonstrate qualification, has been completed; but some open items, which are identified, must be resolved. In all cases, there is a high degree of confidence that the open items will be resolved satisfactorily, thus enabling this status to be upgraded to Qualified - Without Exception.

c. Qualified - For Interim Operation - This Category is used primarily when qualification testing has not been completed, but there is a high degree of confidence that the equipment can be qualified, thus permitting interim

operation. In addition, the criteria in Enclosure 1 of Policy Issue SECY-82-51 issued 2/4/82 for justification for interim operation is used and documented.

d. Relocate Equipment - This category is selected when the equipment is not demonstrated to be qualified for its initial installation location. This equipment must be relocated to a new location where qualification can be demonstrated for the new conditions. (See e, f, g, h, below).

e. Shield Equipment - This category is used when equipment is not demonstrated to be qualified for its installed location and simple shielding (e.g., from beta radiation) can assure adequacy of qualification.

f. Retest Equipment - This category is used when equipment is undergoing retesting to demonstrate qualification as required.

g. Replace Equipment - This category is used when qualification cannot be demonstrated and it is prudent to replace the equipment with a suitable, qualified replacement.

h. Qualified - Awaiting Minor Analysis. (See b above.)

i. Demon. NUREG-0588C - This category is used for equipment in the scope of the definition of Category "C" as state in NUREG 0588, Appendix E.

j. Requires Major Analysis - This category is used when there are significant concerns related to the qualification status of the equipment and a major effort is required to qualify the equipment.

2. Enter data below <u>Environment Parameter Actual (Column 1)</u> as described below:

<u>OPERABILITY</u> Norm/Test DBA	- Enter the requirements for operation which may be in time (hours, days, months, years), cycles, or both.

TEMPERATURE	Enter the maximum normal and DBA peak temperature conditions at the equipment location.
PRESSURE	Enter the maximum normal (generally atmospheric) and DBA peak pressure conditions at the equipment location.
RELATIVE HUMIDITY	Enter the maximum normal and DBA peak humidity conditions at the equipment location.
CHEMICALSPRAY	Enter the values for the chemical composition of the chemical spray (containment spray) utilized in a post-DBA event in containment.
R GAMMA A BETA D B SHIELD S TID	GAMMA is the sum total of the 40 year normal plus applicable (1 yr, 1 mo, 1 day) DBA gamma dose. BETA is the applicable (1 yr, 1 mo, 1 day) DBA Beta Dose. B. SHIELD is the credit (10 - 100%) permitted, to reduce the Beta dose, due to enclosures, material coverings, and thicknesses. TID (Total Integrated Dose) is the sum total of GAMMA plus the equivalent GAMMA equal to the BETA (after shielding) applicable to the equipment.
AGE-INST LIFE (per 323 1974 DEF)	The goal or requirement for equipment life, usually 40 years.
SUBMERGED LEVEL	Maximum plant elevation (Ft.) reached during flood conditions. Generally, equipment should be located above this level.

3. Enter the actual values the equipment is qualified to below Environment Parameter DEM. QUALIF. (column 2) which corresponds on a "one-to-one" basis with the actual parameter (column 1).

4. Enter the reference source below Documentation Actual (column 3) (generally FSAR, Environmental Zone Maps, etc.) which identifies the requirements in column 1.

5. Enter the reference (environmental qualification test reports, engineering analysis, etc.) below Documentation DEM. QUALIF (column 4) which substantiates the information in column 2.

6. Enter the actual methodology used to demonstrate qualification below Qualification Method (column 5). The most likely entry is "Combined Test and Supplementary Review" to indicate that the qualification method is a type test supplemented by analysis/review.

7. Enter data below the H/M (column 6) as to whether a zone's environmental parameter values are harsh or mild.

8. Enter data below Outstanding Items (column 7) for significant items of concern which do not allow an item to be classified as qualified. Minor items just requiring confirmation will not be considered outstanding items.

9. Enter data below the rightmost columns as follows:

REPLACEMENT	Enter requirements to replace item as a condition of qualification, if the equipment or component therein is not qualified to 40 years.
MAINTENANCE	Enter only maintenance/surveillance activities related to qualification.
SUBCOMPONENTS	Enter any components enveloped within a larger qualification package. For example, relays may be included here.
SAFETY FUNCTION	Enter the major plant safety function performed by the system in which the equipment is a part. Examples of safety functions are: Containment Isolation (CI), Emergency Reactor Shutdown (ERS), Reactor Core Cooling (RCC), Containment Heat Removal (CHR), Core Residual Heat Removal (CRHR), Prevention of Significant Release of Radioactive Material to the Environment (PRRM), Supporting Systems (SS).

10. Enter data in the Parameter - Suppl. Review Box (lower mid-left side) as follows:

PARAMETER	A list of all parameters (operability through submergence) being reviewed.
SUPPL. REVIEW	This block identifies the items reviewed in the documentation package (operability, temperature, pressure, relative humidity, chemical spray, radiation, aging, submergence) which justifies qualification.
NUREG-0588 APPENDIX E CATEGORY	Enter the applicable NUREG-0588, Appendix E category listed in paragraph 2. The categories are "A", "B", "C", or "D".

11. Enter data in the lower middle box as follows:

FOR PUNCHLIST ITEMS	Enter the documentation package number where qualification deficiency items may be found.

REFERENCES	Enter Qualification Information and other sources applicable to the equipment being qualified.

12. Enter data in the lower right hand box as follows:

QUALIFICATION SIGN OFF	Enter the documentation package number where the names and signatures of individuals preparing/checking/approving the documentation package may be found.
CES #	Enter the four-digit number which identifies the individual Component Evaluation Sheet. (Optional)
REVISION #	Enter the revision number applicable to the component Evaluation Sheet.
DATE	Enter the date the applicable revision to the Component Evaluation Sheet was verified by the "checker."

ATTACHMENT D

EQUIPMENT DOCUMENTATION CONTROL FORM

ENVIRONMENTAL QUALIFICATION
DOCUMENT CONTROL LOG

Attachment D-1
Rev. 1

PKG.#	DATE REC.	P.O.#	TOPIC	START DATE	DATE COMPLETED	STATUS

Page _____

ATTACHMENT E

EQUIPMENT QUALIFICATION VENDOR MANUAL FORMS

EQUIPMENT _____ VENDOR MANUAL _____

DATE _____

ENVIRONMENTAL QUALIFICATION SUPPLEMENT

Maintenance requirement form (EQBLF1) may require different or additional maintenance than the vendor technical manual.

LIST OF MAINTENANCE REQUIREMENT FORMS ATTACHED

Documentation Package	P.O. #	Form No.
EQDP _____ Rev. _____	_____	_____ each EQBLF1

_____ New Supplement

_____ Revised Supplement

Special Instructions:

1. Replace existing EQBLF1 and EQBLF2 forms with attached EQBLF1, Rev. _____.

Received by: _____ Date: _____

DATE: _____

TO: Manager, Technical Support, SHNPP

FROM: Principal Engineer, I&C Unit, NED

SUBJECT: Equipment Qualification Base Line

The attached forms specify Maintenance Unit activities that must be performed on environmentally qualified equipment to maintain qualification. These forms do not list all maintenance required on the equipment, but rather identifies additional maintenance activities from documentation sources not normally reviewed by the Maintenance Unit.

These forms were generated based on our review of documents associated with:

EQDP No. _____, Rev. _____

Purchase Order/Shop Order(s): _____

_____

_____

_____

Attached Forms:

1. _____ total EQBLF1, Rev. _____

2. _____ total EQBLF10, Rev. _____

Received by: _____ Date: _____

Purchase Order No.: _____

Manufacturer: _____

Model No.: _____

Vendor Manual: _____

Component: _____

Specification: _____

Documentation Package No.: _____ Rev.: _____

EBASCO TAG NO. (CID)	TAG NO.	SYSTEM	EQUIP. CODE	SPECIFIC-ID

PURCHASE ORDER NO.: _____

MANUFACTURER: _____

MODEL NO.: _____

COMPONENT: _____

A. PERIODIC MAINTENANCE:

1. LUBRICATION: _____

2. CYCLING/FUNCTIONABILITY: _____

3. INSPECTION: _____

4. CALIBRATION: _____

B. REPLACEMENT MAINTENANCE:

1. PARTS REPLACEMENT: _____

2. DEVICE REPLACEMENT: _____

PURCHASE ORDER NO.: _____

MANUFACTURER: _____

MODEL NO.: _____

COMPONENT: _____

C. MAINTENANCE CYCLE START DATE: _____

D. INSPECTION REQUIREMENTS: _____

E. REFURBISHMENT: _____

F. CONFIGURATION:

1. MOUNTING: _____

2. SEALING: _____

PURCHASE ORDER NO.: _____

MANUFACTURER: _____

MODEL NO.: _____

COMPONENT: _____

G. MECHANICAL EQUIPMENT QUALIFICATION CONSIDERATIONS: _____

REV.	PAGE	REMARKS	PREPARED	REVIEWED

MANUFACTURER: _____

MODEL NO.: _____

VENDOR MANUAL: _____

COMPONENT: _____

A.1 LUBRICANTS:	DESCRIPTION	CP&L PART NO.
1.		
2.		

B.1 COMPONENT PARTS:	DESCRIPTION	CP&L PART NO.
1.		
2.		
3.		
4.		
5.		

B.2 COMPLETE COMPONENT:	DESCRIPTION	CP&L PART NO.
1.		
2.		

F.2 SEALANTS:	DESCRIPTION	CP&L PART NO.
1.		
2.		

H.1 SPECIAL TOOLS:	DESCRIPTION	CP&L PART NO.
1.		
2.		

H.2 MISCELLANEOUS:	DESCRIPTION	CP&L PART NO.
1.		
2.		

TECH. REVIEW _____